

Sucrose *versus* maltose effect on metabolic pathways in somatic embryogenesis of *Hevea brasiliensis*

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Abstract

Somatic embryogenesis in *Hevea* is stimulated when the embryogenesis induction medium contains maltose, rather than glucose, fructose, or sucrose, in equimolarity (Blanc *et al.*, 1999). Kinetic analyses were carried out on various physiological and biochemical indicators over the eight weeks that the induction phase then expression of somatic embryogenesis can take. Embryogenesis induction in the presence of glucose, fructose or sucrose revealed strong callus growth in the first 3-4 weeks, associated with a high intra and extracellular hexose content, a high starch content and a substantial decline in protein synthesis. Calli grown in the presence of maltose revealed uniform embryogenesis induction that was twice as fast. Their growth was slow and only half that seen with sucrose. This morphogenetic behaviour is associated with a drop in endogenous hexose and starch contents, and an increase in protein synthesis in the first three weeks of culture. At the end of culture, peroxidase activity, and membrane antioxidant and protein contents increased in these calli; these characteristics may be associated with somatic embryo organization and with the maintenance of effective membrane integrity within a nutrient environment that has become limiting. These new results tally with data in the literature on the roles of sugars, and provide some precise information with regard to the "carbohydrate deficit" hypothesis usually put forward to explain maltose action. An analysis of these results led to the hypothesis that regulation of endogenous hexose contents at a low level, through slow maltose hydrolysis, was a key element of the biochemical signal leading these calli towards somatic embryogenesis.

References :

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